

March 21, 1997

VPCD-97-02(LDV/LDT/SV/ICI)

Dear Manufacturer:

**Subject: Certification of 98MY and later ORVR Vehicles**

The purpose of this letter is to provide manufacturers with information reporting requirements for the certification of 1998 and later model year vehicles equipped with ORVR systems. This information is needed pursuant to requirements in section 202(a)(4) and 206(a)(3) of the Clean Air Act, related to the safety of the ORVR emission control system. In addition, this letter provides information about the compatibility of ORVR designs with conventional and Stage II refueling nozzles and guidance regarding the ORVR test procedure.

**ORVR Certification Reporting Requirements - Background**

Section 202(a)(4) of the Clean Air Act, as amended, places the burden on the manufacturers to establish that emission control systems or elements of design used in 1979 and later new motor vehicles or motor vehicle engines do not "cause or contribute to an unreasonable risk to public health, welfare, or safety in its operation or function." Section 206(a)(3) reads, in part: "A certificate of conformity may be issued ..... only if the Administrator determines that the manufacturer (or in the case of a vehicle or engine for import, any person) has established to the satisfaction of the Administrator that any emission control device, system, or element of design installed on, or incorporated in, such vehicle or engine conforms to the applicable requirements of section 202(a)(4)."

Section 202(a)(6) of the 1990 Clean Air Act Amendments requires EPA to consult with the Secretary of Transportation regarding the safety of vehicle-based systems for the control of vehicle refueling emissions. During the course of the rulemaking, the National Highway Traffic Safety Administration (NHTSA) worked with EPA on the safety aspect of ORVR systems and provided assessments of the safety of ORVR systems. Ultimately, it was determined that it is possible to design safe ORVR systems, and in 1994, EPA

published regulations requiring the phase-in of onboard refueling vapor recovery (ORVR) emission standards beginning in the 1998 model year, ref. 59 FR 16262, April 6, 1994. Because of the history of the rule regarding safety concerns and to help ensure safe systems, the preamble to the regulation stated:

"During review of the certification application, EPA will study the design of the vehicle's ORVR system, its on-

vehicle configuration and operation, and will consult directly with NHTSA on these applications."

### **ORVR Certification Information Reporting Requirements**

Based on the above mentioned regulations and sections of the Clean Air Act, EPA intends to work with NHTSA to evaluate the safety of ORVR systems prior to issuing certificates of conformity. The enclosure to this letter contains information reporting requirements which EPA and NHTSA are proposing as the basis for the evaluation. Other information may also be required in some cases. The information should be sent directly to your certification team member, with a copy mailed to:

Mr. Scott B. York - Mail Code NSA-122  
U.S. Department of Transportation  
National Highway Traffic Safety Administration  
Office of Defects Investigation  
400 7th Street, S.W.  
Washington, D.C. 20590  
(202) 366-5209 (voice) (202) 366-1767 (fax)

EPA will rely on NHTSA to perform the initial safety review of manufacturer's ORVR designs. The review process should take approximately 2-4 weeks. Therefore, to ensure that the ORVR safety review does not adversely impact the manufacturer's certification time schedule, manufacturers should supply this information as soon as practicable after ORVR production plans have been finalized, i.e. no later than one or two months prior to certification.

### **ORVR & Refueling Nozzle Compatibility**

As most manufacturers know, an ORVR/Stage II Vapor Recovery workgroup has been formed to address several short term concerns relevant to the safety and compatibility of ORVR controls with Stage II systems. This workgroup is chaired by Mr. James Morgester, of California Air Resources Board (ARB), and composed of representatives of ARB, EPA, the automobile industry and the petroleum industry.

As outlined in EPA's October 23, 1996 presentation to that workgroup, it is imperative that all ORVR vehicles can be refueled at any Stage II or conventional gas station throughout the United States. To address concerns by the petroleum industry and automobile industry representatives, a compatibility test program

was begun on January 27, 1997 in Sacramento, California under the supervision of ARB. The purpose of the test program was to simulate and assess possible difficulties a customer may experience when dispensing gasoline from conventional and Phase II vapor recovery nozzles to ORVR-equipped vehicles. The test program was intended to simulate typical customer refueling at service stations, including high clip, low clip, and pre-pay dispensing, but was not intended to simulate atypical refueling modes. EPA encouraged participation in this test program by all major automobile and nozzle manufacturers. To obtain information about the test program, manufacturers may contact Joe Guerrero at (916) 324-7343, Ranjit Bhullar at (916) 323-7370 or Paul Thalken at (916) 445-0383 of ARB.

EPA encourages manufacturers to conduct their own testing, as necessary, to assure the compatibility of their ORVR designs with the nozzles and refueling systems that are in the field today. Manufacturers may want to include atypical refueling operations such as "topping off" of vehicle fuel tanks, low fuel dispensing rates, and testing in a vapor growth mode (i.e. high RVP into low RVP or warm fuel into cold fuel). Please inform Mr. Dave Good or Ms. Lynn Sohacki, of my staff, of any incompatibility problems attributed to atypical refueling events or to inherent design features of conventional or Stage II refueling systems/nozzles.

#### **ORVR Emission Testing - Conventional Nozzles**

The American Automobile Manufacturers Association (AAMA); Association of International Automobile Manufacturers (AIAM); and several automobile manufacturers have requested guidance regarding the nozzle specifications to be used for ORVR tests. Manufacturers have identified three important parameters which impact the ORVR emission test:

- nozzle geometry;
- shutoff performance; and
- air entrainment rate.

Manufacturers believe that 1) SAE J285 is the appropriate specification for nozzle geometry; 2) although shutoff performance specifications are contained in California Code of Regulation, Title IV, Article 2, section 4054.2, a more consistent shutoff test is needed; and 3) no test procedure or in-use specification currently exists for air entrainment rate.

Currently, an SAE ORVR Task Force is investigating the important nozzle characteristics which influence ORVR emissions. However, it is expected to be some time until the committee makes recommendations for nozzle shut-off performance and air entrainment rates. Manufacturers have requested (and EPA concurs with that request) to select representative nozzles that provide consistent performance characteristics and have a consequential market penetration. Initially, for 1998 model year testing, EPA prefers that manufacturers use a high sales nozzle (or equivalent) for ORVR testing. EPA would concur with the use of OPW model 11AP or OPW model 11BP (which is considered equivalent in emission performance to OPW model 11AP).

In the long term, EPA intends to work with the SAE committee to define appropriate nozzle performance characteristics, in hopes of standardizing the ORVR test procedure and improving in-use emissions performance. EPA encourages automobile and nozzle manufacturers to participate on that committee.

#### **ORVR Emission Testing - Stage II Nozzles**

The provisions of 40 CFR 86.107-98(j) currently require that for ORVR testing, "The dispensing nozzle shall be a commercial model, not equipped with vapor recovery hardware." EPA is concerned that a substantial number of service stations, especially those in nonattainment areas are equipped with vapor recovery hardware. EPA recognizes that since the inside diameter of the fuel dispensing portion of a vapor recovery nozzle is much smaller in diameter than that of a conventional nozzle, the fuel velocity is much higher. This difference, and other design differences between Stage II and conventional nozzles may have an adverse effect on the ability of the ORVR canister to adsorb refueling vapors. EPA believes that it is appropriate to conduct ORVR tests with either conventional or Stage II nozzles, and intends to revise the regulations to provide assurance that ORVR vehicles will comply when tested with either type of nozzle. Manufacturers would be given an opportunity to discuss the ramifications of possible regulation changes prior to proceeding with the rulemaking. In the meantime, we encourage manufacturers to conduct ORVR tests using both conventional and Stage II nozzles.

#### **ORVR Emission Testing - Flow Rate**

The provisions of 40 CFR 86.154-98(e)(6) currently require that for

ORVR testing, "The fuel shall be dispensed at .....a dispensing rate of  $9.8 \pm 0.3$  gal/min ( $37.1 \pm 1.1$  liter/min). In testing conducted by the Administrator, a lower dispensing rate (no lower than 4.0 gal/min (15.1 liter/min) may be used. EPA is concerned about the ability of the ORVR vehicle designs to perform efficiently at lower flow rates, and intends to perform some confirmatory tests at lower flow rates. Initially, EPA confirmatory tests will have to be performed at the manufacturer's facility, since EPA's refueling test facility is not expected to be ready until the spring of 1998, at the earliest.

If you have any questions about this letter, please contact Lynn Sohacki at (313) 741-7851, or Dave Good at (313) 668-4450.

Sincerely,

Jane Armstrong, Director  
Vehicle Programs and Compliance Division  
Office of Mobile Sources

Enclosure

cc: S. York, NHTSA  
J. Morgester, ARB

## Enclosure I

### **Information Required for Certification of Vehicles Equipped with Onboard Refueling Vapor Recovery (ORVR) Systems**

1. Submit a copy of the manufacturer's written safety statement of compliance required by 40 CFR 86.090-5(b)(1)(ii), 40 CFR 86.091-23(d) and Advisory Circular 76 that deal with ORVR systems which will be included in the application for certification.
2. Provide a description and schematic of the ORVR system (in English, no blueprints please). Include detailed information such as the physical and functional properties of the canister, the canister size, vapor line material, vapor line inner and outer diameter, various valves used, settings, and operation, hose connector type, on-board diagnostic (OBD) monitoring strategy, material and size of the fuel tank, filler neck, and guide plate, and any other relevant information.
3. Describe any special refueling procedures for the subject vehicle system required or recommended at Stage II or non-Stage II refueling stations.
4. Provide a copy of the vehicle owner's manual or applicable ORVR sections with refueling instructions, safety precautions, and any other relevant ORVR related information tab indexed and highlighted.
5. Provide copies of the vehicle service manual sections that deal with ORVR system repair and maintenance. Tab index and highlight all safety warnings and precautions relating to proper repair/maintenance, reconnecting or installation of ORVR hoses, safety risks associated with malmaintenance or tampering, etc.
6. Furnish any manufacturer information relating to safety-related in-use problems, defects, or recalls on systems and components similar to ORVR systems and components.
7. If the ORVR system is not maintenance free for the useful life of the vehicle, furnish a schedule of required maintenance.
8. Provide an attestation that the ORVR system is properly

designed with respect to electrostatic discharge phenomenon, ref. SAE J1645. To prevent electrostatic discharges in the fill inlet area during refueling, it is standard automotive practice for vehicles to contain a primary ground path from the filler inlet (at the point of nozzle contact) to the refueling nozzle of the service station, and a secondary ground path from the fill inlet to the vehicle ground. Describe both paths to ground in the subject system, listing all vehicle components contained in each ground path. Include the composition of components (i.e., metallic, conductive plastic, rubber); the resistivity of the non-metallic materials; and the total resistance to vehicle ground.

9. Provide a template or an outline of the failure mode and effects analysis, which was used to evaluate all possible outcomes in the event of an ORVR component or system failure, either mechanical or functional. Include an attestation that this failure mode and effects analysis was used by the manufacturer to evaluate the ORVR system of the vehicles being certified, and a summary of the overall results of the failure mode and effects analysis. The summary should include (but not be limited to) all consequences such as potential fires, refueling spitback, premature nozzle shutoff, fuel spillage, and instances in which the vehicle could no longer be refueled. The summary should not include actual test data.

The template should include (but not be limited to) the effects of repeated attempts by the customer to top off the fuel tank, thermal expansion of the fuel, failure of the dispensing nozzle to shut off, and fuel tank over pressure/under pressure conditions.

(revised 3/17/97)



c:\\$docs\lorvr\mfr-ltr.397